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⑤④考案の名称　液晶表示装置

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明　　細　　書（１）

１．考案の名称

液晶表示装置

２．実用新案登録請求の範囲

（１）　駆動用のＩＣを搭載した複数のテープキャリアを周縁部に接続した液晶パネルと、

この液晶パネルの周縁部を前面側から覆う前面部及びこの前面部の外周からその奥行方向に向って奥行部を折曲形成した額縁状の金属製の外枠体と、

前記液晶パネルの周縁部を背面側から覆う平面部及びこの平面部の外周の少なくとも一部からその奥行方向に向って接合部を折曲形成した金属製の内枠体とを備え、

前記液晶パネルの周縁部を外枠体の前面部と内枠体の平面部とで挟持すると共に、外枠体の奥行部と内枠体の接合部とを結合した液晶表示装置において、

前記外枠体の奥行部と内枠体の接合部とを、外側からの装着によって締結される片側締結用の

1180

実開4-20086

リベットで固定した

ことを特徴とする液晶表示装置。

3．考案の詳細な説明

〔考案の目的〕

（産業上の利用分野）

本考案は、液晶テレビ等に用いる液晶表示装置に関する。

（従来の技術）

液晶テレビ等の各種の液晶表示装置においては、表示部は大きく形成するが、表示部以外の電子回路はできるだけ小形でコンパクトに組立てるものが望まれており、このような要望に応えるものとして、先に、特開平１－２３７５９１号公報に示される液晶表示装置が提案されている。

この先に提案されている液晶表示装置は、液晶パネルの周縁部の端子と、駆動用のＩＣを搭載した複数のテープキャリアの端子とを異方性導電膜をもって接続すると共に、この接続部の外側近傍でテープキャリアをその接続面に対する奥行方向に折曲し、また、前記液晶パネルの周縁部を前

面側から覆う前面部及びこの前面部の外周からその奥行方向に向って奥行部を折曲形成した額縁状の金属製の外枠体と、前記液晶パネルの周縁部を背面側から覆う平面部及びこの平面部の外周の角部からその奥行方向に向って接合部を折曲形成した金属製の内枠体とを備え、前記液晶パネルの周縁部を外枠体の前面部と内枠体の平面部とで挟持すると共に、外枠体の奥行部と内枠体の接合部とを結合し、かつ、前記テープキャリアの入力端子を前記外枠体に一体化して形成した回路配線の端子に接続し、液晶パネルとテープキャリアとの異方性導電膜による接続部を内外側から覆って押圧するとともに、奥行部でテープキャリアの奥行方向に折曲された部分の外側を覆ったものである。

このように、液晶パネルに接続したテープキャリアをその接続部の外側近傍で接続面に対する奥行方向に折曲し、この接続部及び折曲部分を外枠体と内枠体とにより内外側から覆うとともに、接続部を外枠体の前面部及び内枠体の平面部で内外側から挟圧することにより、接続部に引きはが

す方向の外力が加わることはなく、液晶パネルの端子部分における接続不良が発生せず、良好な接続状態が保たれ、かつ、小形コンパクトにすることができるものである。

ところで、この場合、外枠体の奥行部と内枠体の接合部とを締付けて固定することにより、液晶パネルを挟持するものであるが、従来、外枠体内枠体との結合は、螺子とナットとで行なっている。

すなわち、螺子を外枠体の外側から外枠体の奥行部及び内枠体の接合部に形成した締付孔を通し、内枠体の内側でナットを螺合して締付けている。

（考案が解決しようとする課題）

上記液晶表示装置の場合、外枠体と内枠体の固定は、内枠体の内側という小さなスペースにおいて、螺子とナットとの締付けにより行なっているため、作業性が悪く、作業に時間を要し、量産プロセスには向いていない。

本考案の目的は、製造にあたって、作業性が

良く、組立作業の省力化、作業時間の短縮ができ、量産性があり、製造コストの低減ができる液晶表示装置を提供することにある。

〔考案の構成〕

（課題を解決するための手段）

本考案は、駆動用のＩＣを搭載した複数のテープキャリアを周縁部に接続した液晶パネルと、この液晶パネルの周縁部を前面側から覆う前面部及びこの前面部の外周からその奥行方向に向って奥行部を折曲形成した額縁状の金属製の外枠体と、前記液晶パネルの周縁部を背面側から覆う平面部及びこの平面部の外周の少なくとも一部からその奥行方向に向って接合部を折曲形成した金属製の内枠体とを備え、前記液晶パネルの周縁部を外枠体の前面部と内枠体の平面部とで挟持すると共に、外枠体の奥行部と内枠体の接合部とを結合した液晶表示装置において、前記外枠体の奥行部と内枠体の接合部とを、外側からの装着によって締結される片側締結用のリベットで固定したものである。

（作用）

本考案では、外枠体の奥行部と内枠体の接合部とを、片側締結用のリベットを用い、外枠体の外側からの装着によって締結する。

（実施例）

以下、本考案の一実施例を図面を参照して説明する。

第１図、第２図及び第３図において、液晶パネル11は、従来と同様に２枚のガラス基板11A，11B に単位画素を構成する多数のＴＦＴや透明電極等を設けると共に、この２枚のガラス基板11A，11B 間に液晶を封入したものである。また、この裏面側のガラス基板11A は、表面側のガラス基板11B より大きくて縁部が外側に突出していると共に、この突出した縁部の４個の角部を切除して傾斜部11a を設けている。なお、液晶パネル11としては、上述したＴＦＴを用いた、いわゆるＴＦＴ－ＬＣＤでなくともよく、他のアクティブマトリックス表示デバイスや、ドットマトリックス表示デバイスでもよい。いずれにしても液晶パネル11はガラス基板11A，11B を有し、この裏面側のガ

ラス基板11Aの周縁部（図示の場合は3辺）には画素を駆動するためのリード用の端子が多数配列されている。この端子の本数、すなわち、縦方向の本数mと横方向の本数nは、一般に全画素数をZとすると、Z＝m×nで示される。例えば、液晶パネル11の対角4インチの表示面にZ＝115200画素が並んでいれば、縦方向240本、横方向480本の端子が必要となる。そして、これら各端子を介して各画素を駆動する駆動用のICとして、例えば、縦方向用、横方向ともに120素子を1チップに内蔵しているものを用いる。すなわち、縦方向は、120素子のICを2個用いて駆動し、横方向は、120素子のICを4個用いて駆動する。

ここで、対角4インチの表示部の縦辺と横辺は60㎜×80㎜となる。液晶パネル11の周縁部に配列される端子のピッチは200μmより小さいと接続技術が高度になり、接続が困難となるので、横辺方向は上辺と下辺に分け、ICを2個ずつ配置することにより端子ピッチを333μmとしてい

る。また、縦方向は片側１辺だけでも端子ピッチは２５０μmとなり、片側１辺にのみＩＣを２個配置している。

上記のような縦方向用のＩＣ12Y 及び横方向用のＩＣ12X は共に対応する複数のテープキャリア13Y 及び13X にそれぞれ搭載されて電気的に接続される。この接続は、金（Au）バンプを形成したＩＣ12X，12Y の端子と、銅（Cu）リードにすず（Sn）メッキを施したポリイミドフィルムベースのテープキャリア13X，13Y の端子との位置整合を行なった後、加熱加圧によりAu／Sn共晶を行なわせ、接合する。

次に、上述のようにしてＩＣ12X，12Y を搭載したテープキャリア13X，13Y を液晶パネル11の周縁部の端子に接続する。この接続は異方性導電膜を用いて行なう。すなわち、液晶パネル11の端子とテープキャリア13X，13Y の出力端子とを同ピッチで形成しておき、これらの位置整合を行なった後、異方性導電膜を介在させ、加熱加圧してこの間を接続する。

16は金属製の外枠体で、例えば、厚さ 0.5～1.0mm程度の薄いステンレス等の金属板により形成されている。この外枠体16は、前記液晶パネル11の前面周縁部を覆う平面状の前面部16aと、この前面部16aの外周からその奥行方向に向って図示のように直角に、またはより鋭角に折り曲げた奥行部16bとを有する額縁状をなしている。また、奥行部16bの4個の角部には前記液晶パネル11の各傾斜部11aと対応する傾斜状の接合面16cが形成され、この接合面16cに締付孔17が穿設されている。さらに、奥行部16bの内面に回路配線18が一体化して形成されている。この回路配線18は、前記駆動用のIC12X，12Yの端子群をそれぞれ個別に接続して、駆動用のIC12X，12Yの入力端子に特定の電圧や信号を与えるものである。

19は前記外枠体16の内側に配設される金属製の内枠体である。この内枠体19は、前記外枠体16の前面部16aに対向する平面部19a及びこの平面部19aの4個の角部外側から前記外枠体16の奥行部16bの角部における接合面16cと対向する接合

部19bを折曲形成し、この接合部19bに締付孔20が穿設されている。

そうして、前記各テープキャリア13X，13Yは、液晶パネル11の端子と接続した後、図示のようにその接続部の外側近傍で接続面に対する奥行方向に折り曲げておく。

この状態において、前記外枠体16を液晶パネル11の表面側からかぶせ、その前面部16aによって液晶パネル11の端子とテープキャリア13X，13Yとの異方性導電膜による接続部分を前面側から覆い、この部分をゴム等のクッション材21を介して押え付け、接着部分がはがれないように保護する。また、外枠体16の奥行部16bによって、テープキャリア13X，13Yの奥行方向に折曲された部分や、それに搭載されているＩＣ12X，12Yをそれらの外側から覆って保護する。

また、前記外枠体16の内側に内枠体19を配置し、その平面部19aで液晶パネル11の周縁部を背面側から覆い、外枠体16の前面部16aと内枠体19の平面部19aとで液晶パネル11とテープキャリア

13X，13Yとの異方性導電膜による接続部を内外側からゴム等のクッション材22を介して挟圧すると共に、外枠体16の奥行部16bにおける角部の接合面16cと内枠体19の接合部19bとを両者間にスペーサ23を配置して締付孔17，20を介して片側締結用のリベット（鋲）25により締付け固定する。

また、前記外枠体16の奥行部16bの内面に一体化して形成した回路配線18の端子にテープキャリア13X，13Yの入力端子をはんだ付けして接続する。すなわち、上記IC12X，12Yの入力側の端子を、テープキャリア13X，13Yを介して回路配線18に接続する。

上記片側締結用のリベット25は、第4図(A)に示すように、締結体26とマンドレル27とからなっている。上記締結体26は、所定長さの筒状部26aの外端外周部にフランジ部26bが一体に形成されている。また、マンドレル27は、上記筒状部26a内に外方に長く突出した棒材27aが挿入され、この棒材27aの内端近くに狭小部27bが形成されていると共に、棒材27aの内端部に上記筒状部

26a の外径内に位置する押圧体27c が取付けられている。そして、上記締結体26はマンドレル27より柔軟な金属材料で形成されている。

そうして、第4図(B) のように、リベット25を外枠体16の接合面16c における締結孔17からスペーサ23内を通して内枠体19の接合部19b における締結孔20内に挿入し、締結体26のフランジ部26b を締付孔17の座ぐり面17a に当接した状態で、外方に突出しているマンドレル27の棒材27a に締結用工具28を装着する。ついで、この締結用工具28を操作し、締結体26を一定位置に保持した状態で、マンドレル27の棒材27a を外方に引き抜くように外方に引張る。これによって、締結体26はマンドレル27より柔軟な金属材料であるので、マンドレル27の押圧体27c により押圧されて塑性変形を起し、締結体26の筒状部26a の内端部に膨出部26d が形成され、外枠体16と内枠体19とをフランジ部26b と膨出部26d との間で締結し、ついで、さらに棒材27a を引張ることにより、棒材27a がその狭小部27b から切断され、押圧体27c を残し

て大部分が外方に引き抜かれ、第４図(C)のような締結状態となる。また、第４図(C)では、押圧体27cを残すタイプのリベット25を用いているが、第４図(D)のように、押圧体27cを残さないタイプのリベット25でももちろん構わない。このように、外枠体16の奥行部16bと内枠体19の接合部19bとを、片側締結用のリベット25を用いて結合することにより、外枠体16の外側からの作業で締結でき、液晶表示装置の製造において、作業性が良く、組立作業の省力化、作業時間の短縮がはかれる。

〔考案の効果〕

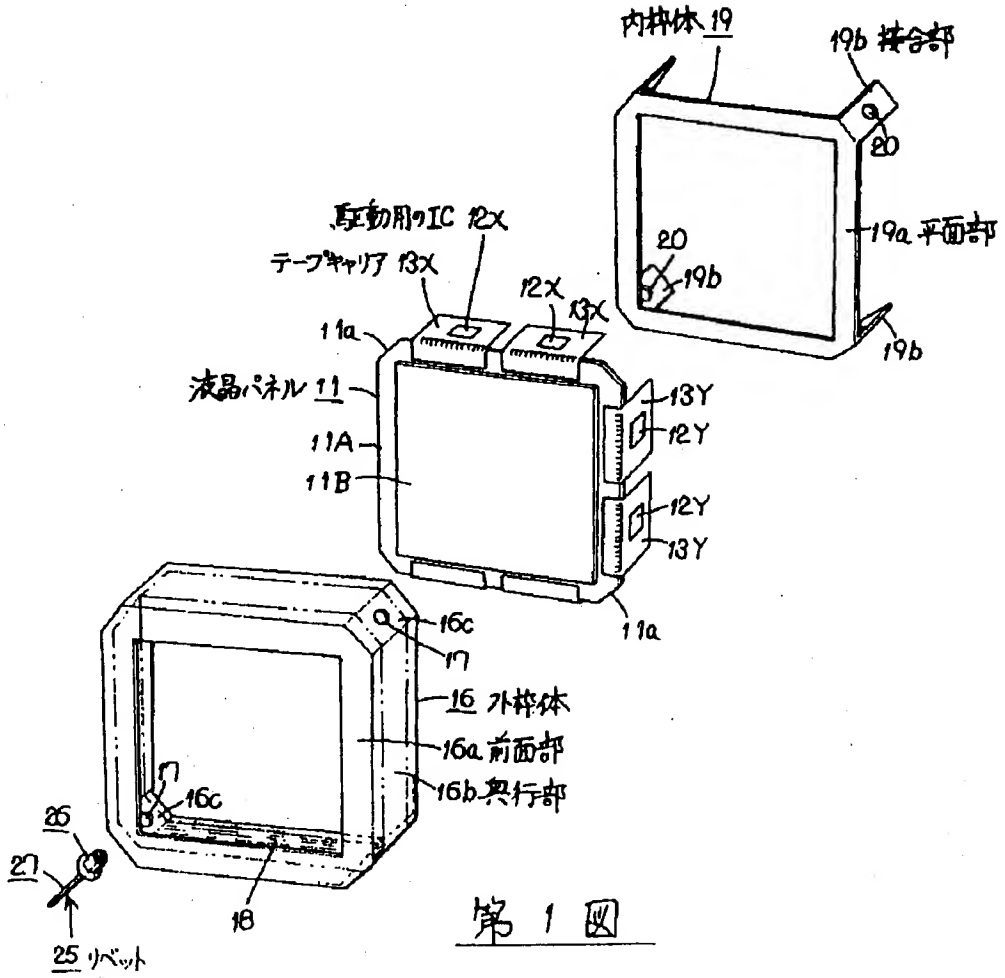
本考案によれば、外枠体の奥行部と内枠体の接合部とを、片側締結用のリベットを用い、外枠体の外側からの装着によって締結することにより、製造にあたって、作業性が良く、組立作業の省力化、作業時間の短縮ができ、量産性があり、製造コストの低減を行なうことができる。

４．図面の簡単な説明

第１図は本考案による液晶表示装置の一実施

例を示す分解斜視図、第２図及び第３図はそれぞれ第１図の組立状態を示す一部の断面図、第４図(A)(B)(C)(D)は第１図の片側締結用のリベットの装着状態を示す断面図である。

11・・液晶パネル、12X，12Y・・駆動用のＩＣ、13X，13Y・・テープキャリア、16・・外枠体、16a・・前面部、16b・・奥行部、19・・内枠体、19a・・平面部、19b・・接合部、25・・片側締結用のリベット。



第 1 図

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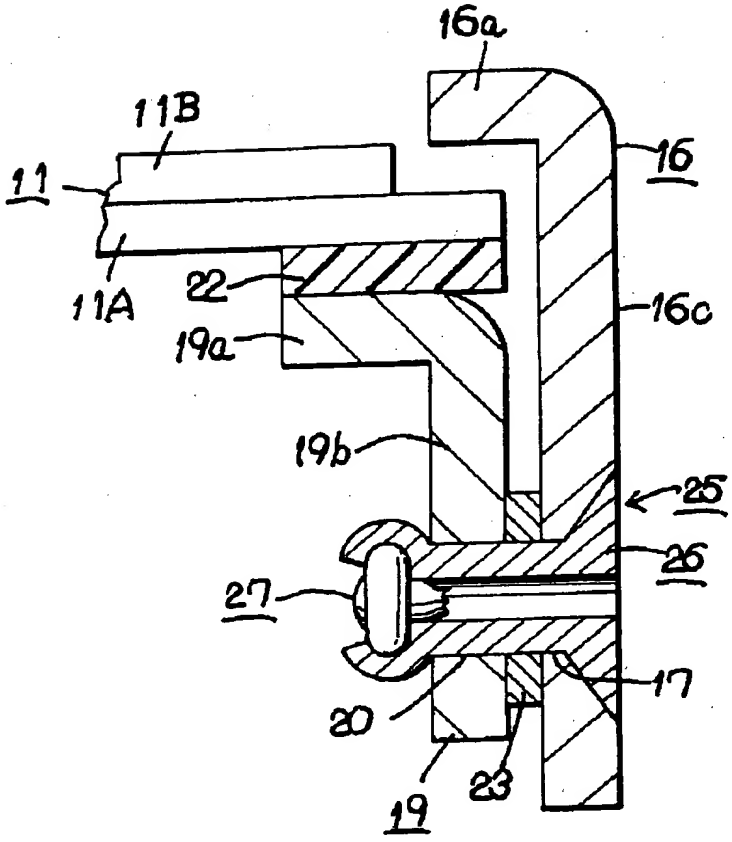
1194 ··· ·S6·



第２図

1195

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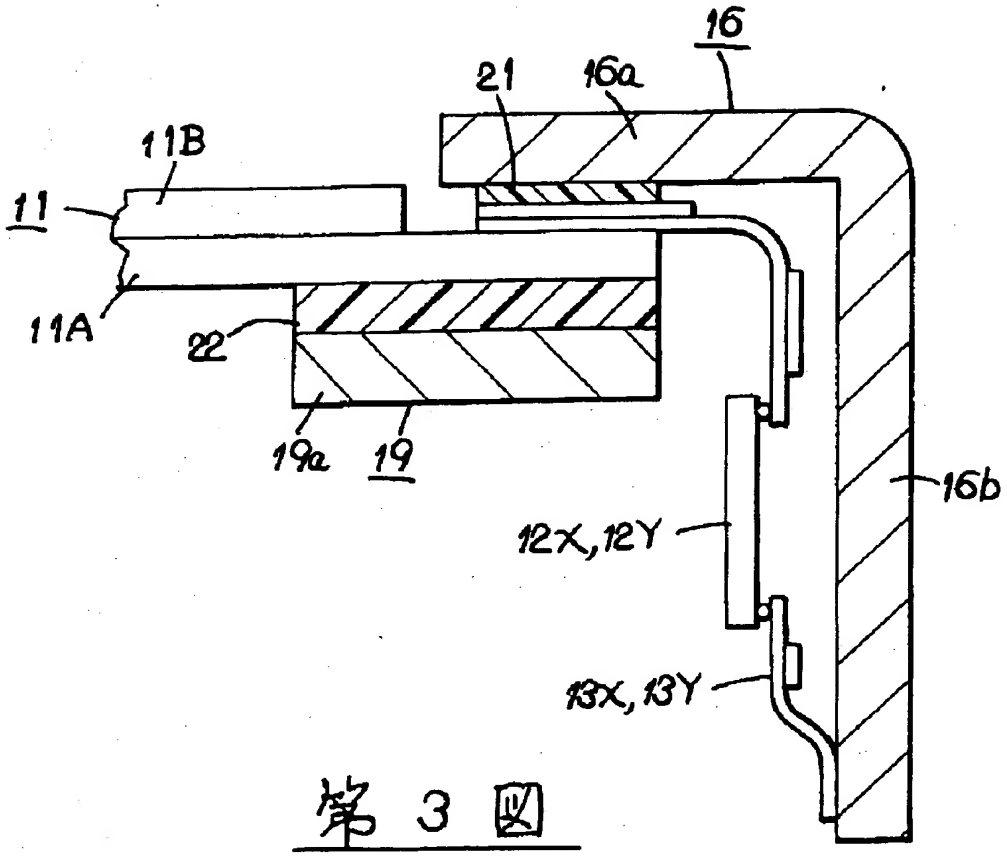

第３図

1196

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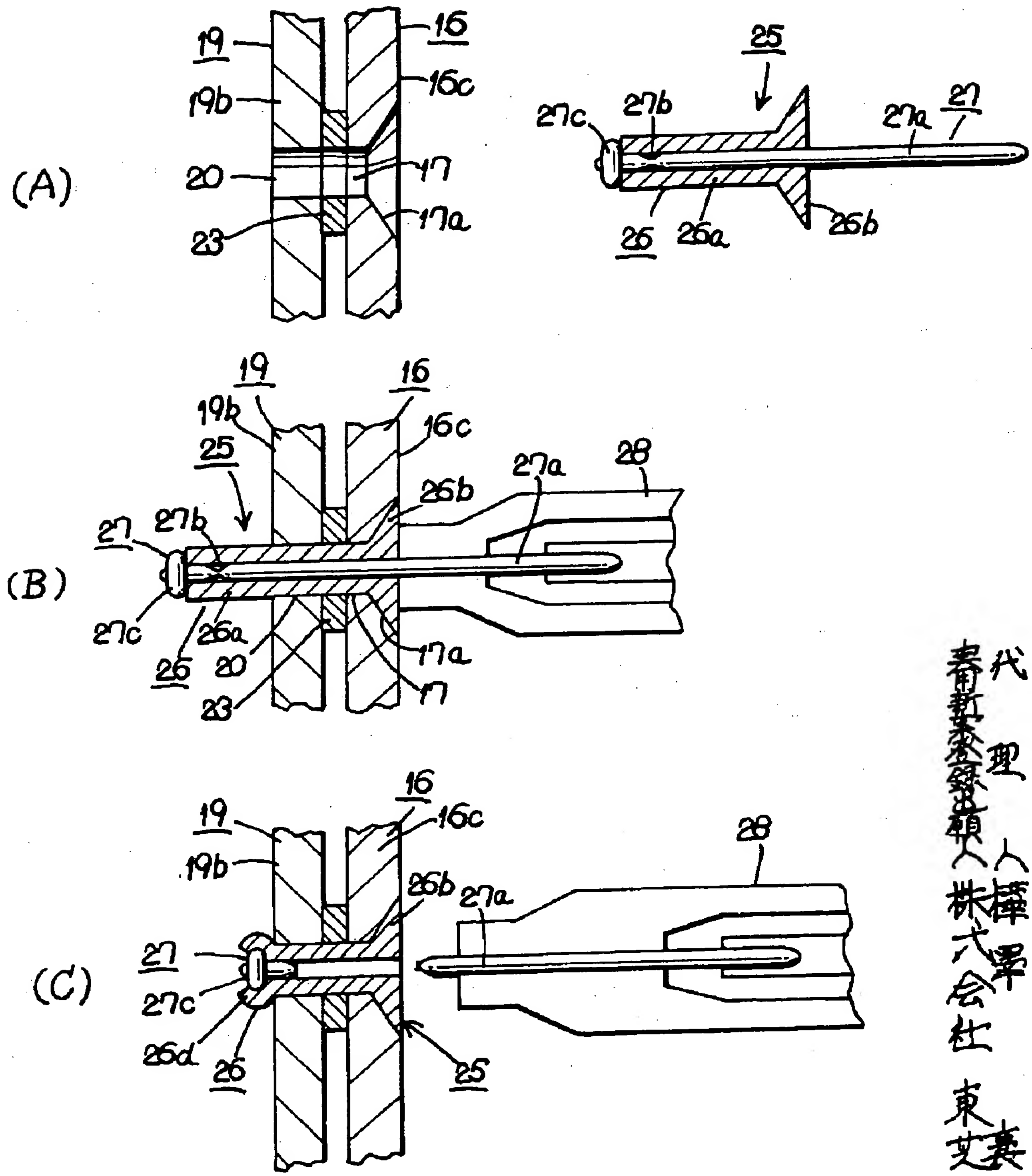
[redacted] [redacted]



第4図

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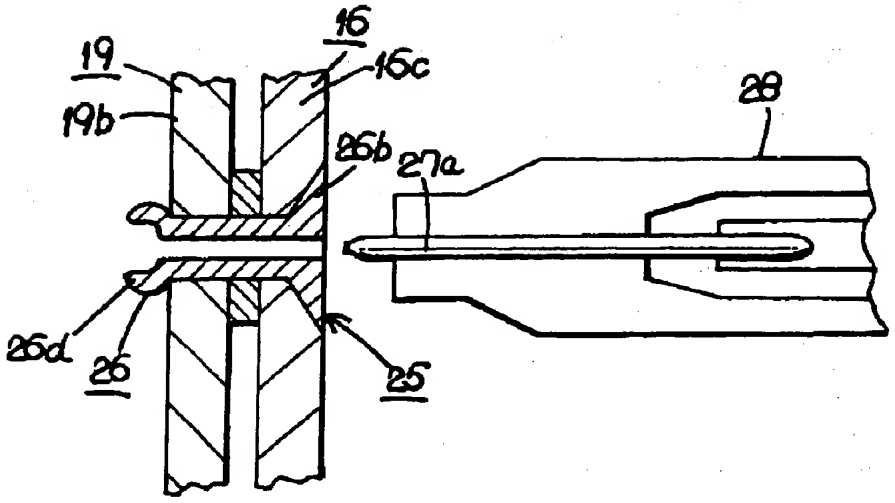
(D)



第4図

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SPECIFICATION (1)

1. Title of the Device

LIQUID CRYSTAL DISPLAY DEVICE

2. Claims

(1) A liquid crystal display device [i] which comprises

a liquid crystal panel in which a plurality of tape carriers having driving ICs mounted thereon are connected to the peripheral edge portions [of the panel],

a frame-form outer frame body made of metal in which a front surface part that covers the peripheral edge portions of this liquid crystal panel from the front surface side and depth parts that are oriented in the direction of depth from the outer periphery of this front surface part are formed by bending, and

an inner frame body made of metal in which a flat surface part that covers the peripheral edge portions of the above-mentioned liquid crystal panel from the back surface side and joining parts that are oriented in the direction of depth from at least portions of the outer periphery of this flat surface part are formed by bending, and

[ii] in which the peripheral edge portions of the above-mentioned liquid crystal panel are clamped between the front surface part of the outer frame body and the flat surface part of the inner frame body, and the depth parts of the outer frame body and the joining parts of the inner frame body are joined,

this liquid crystal display device being characterized in that

the depth parts of the above-mentioned outer frame body and the joining parts of the inner frame body are fastened by one-sided fastening rivets that are fastened by mounting from the outside.

3. Detailed Description of the Device

(Object of the Device)

(Field of Industrial Utilization)

The present device relates to a liquid crystal display device which is used in liquid crystal televisions, etc.

(Prior Art)

In various types of liquid crystal display devices such as liquid crystal televisions, the display part is formed with a large size; however, it is desirable that the electronic circuits other than the

display part be as small as possible, and that these circuits be assembled in a compact manner. The liquid crystal display device described in Japanese Patent Application Kokai No. H1-237591 has previously been proposed as a liquid crystal display device that meets such requirements.

This previously proposed liquid crystal display device comprises a frame-form outer frame body made of metal in which terminals on the peripheral edge portions of a liquid crystal display panel and terminals on a plurality of tape carriers having driving ICs mounted thereon are connected via anisotropic conductive films, in which the tape carriers are bent in the direction of depth with respect to the connecting surfaces in the vicinity of the outsides of these connection parts, and in which a front surface part that covers the peripheral edge parts of the above-mentioned liquid crystal panel from the front surface side and depth parts that are oriented in the direction of depth from the outer periphery of this front surface part are formed by bending, and an inner frame body made of metal in which a flat surface part that covers the peripheral edge portions of the above-mentioned liquid crystal panel from the back surface side and joining parts that are oriented in the direction of depth from the corner parts of the outer periphery of this flat surface part are formed by bending. [In this liquid crystal display device,] the peripheral edge portions of the above-mentioned liquid crystal panel are clamped between the front surface part of the outer frame body and the flat surface part of the inner frame body, and the depth parts of the outer frame body and joining parts of the inner frame body are joined. Furthermore, the input terminals of the above-mentioned tape carriers are connected to the terminals of circuit wiring formed as an integral part of the above-mentioned outer frame body, the connection parts of the liquid crystal panel and tape carriers that are connected by the anisotropic conductive films are covered and pressed from the inside and outside, and the outsides of the portions of the tape carriers that are bent in the direction of depth are covered by the depth parts [of the outer frame body].

Thus, as a result of the tape carriers connected to the liquid crystal panel being bent in the direction of depth with respect to the connecting surfaces in the vicinity of the outsides of the connection parts, these connection parts and bent parts being covered from the inside and outside by the outer frame body and inner frame body, and the connection parts being clamped from the inside and outside by the front surface part of the outer frame body and the flat surface part of the inner frame body, no external force in the stripping direction is applied to the connection parts. Accordingly, no faulty connections are generated in the terminal parts of the liquid crystal panel, and a good connection state is maintained. Moreover, the device can be made compact.

In this case, the liquid crystal panel is clamped by fastening the depth parts of the outer frame body and the joining parts of the inner frame body; conventionally, the joining of the outer frame body and inner frame body has been accomplished by means of screws and nuts.

Specifically, screws are passed through fastening holes formed in the depth parts of the outer frame body and joining parts of the inner frame body from the outside of the outer frame body, and are fastened by being engaged with nuts on the inside of the inner frame body.

(Problems that the Device is to Solve)

In the case of the above-mentioned liquid crystal display device, the fastening of the outer frame body and inner frame body is accomplished by means of screws and nuts in a small space located on the inside of the inner frame body; consequently, the working characteristics are poor and time is required for the [fastening] work, so that this device is not suited for a mass production process.

The object of the present device is to provide a liquid crystal display device which has good working characteristics in terms of manufacture, so that the effort required in the assembly work can be reduced, and the working time can be shortened, thus providing [suitable] mass production characteristics and allowing a reduction in the manufacturing cost.

(Constitution of the Device)

(Means for Solving the Problems)

The present device is a liquid crystal display device [i] which comprises a liquid crystal panel in which a plurality of tape carriers having driving ICs mounted thereon are connected to the peripheral edge portions [of the panel], a frame-form outer frame body made of metal in which a front surface part that covers the peripheral edge portions of this liquid crystal panel from the front surface side and depth parts that are oriented in the direction of depth from the outer periphery of this front surface part are formed by bending, and an inner frame body made of metal in which a flat surface part that covers the peripheral edge portions of the above-mentioned liquid crystal panel from the back surface side and joining parts that are oriented in the direction of depth from at least portions of the outer periphery of this flat surface part are formed by bending, and [ii] in which the peripheral edge portions of the above-mentioned liquid crystal panel are clamped between the front surface part of the outer frame body and the flat surface part of the inner frame body, and the depth parts of the outer frame body and the joining parts of the inner frame body are joined, [this liquid crystal display device being characterized in that] the

depth parts of the above-mentioned outer frame body and the joining parts of the inner frame body are fastened by one-sided fastening rivets that are fastened by mounting from the outside.

(Operation)

In the present device, the depth parts of the outer frame body and the joining parts of the inner frame body are fastened by using one-sided fastening rivets, and mounting [these rivets] from the outside of the outer frame body.

(Embodiments)

One embodiment of the present device will be described below with reference to the figures.

In Figures 1, 2 and 3, the liquid crystal panel 11 is constructed as follows (in the same manner as in conventional [techniques]): namely, numerous TFTs and transparent electrodes, etc., that constitute unit pixels are installed on two glass substrates 11A and 11B, and a liquid crystal is sealed between these two glass substrates 11A and 11B. Furthermore, the glass substrate 11A on the back surface side is formed so that this substrate is larger than the glass substrate 11B on the front surface side, with the edge portions of the glass substrate 11A protruding to the outside. Furthermore, the four corner parts of these protruding edge portions are cut away so that oblique parts 11a are formed. Furthermore, the liquid crystal panel 11 need not be a so-called TFT-LCD using the above-mentioned TFTs; this liquid crystal display panel 11 may also be some other active matrix display device or dot matrix display device. In any case, the liquid crystal panel 11 has glass substrates 11A and 11B, and numerous lead terminals that are used to drive the pixels are disposed on the peripheral edge portions (on three sides in the case shown in the figures) of the glass substrate 11A on the back surface side. The numbers of these terminals, i.e., the number m in the vertical direction and the number n in the horizontal direction, are generally indicated by $Z = m \times n$, where Z is the total number of pixels. For example, if $Z = 115{,}200$ pixels are lined up on a display surface with a diagonal size of 4 inches in the liquid crystal panel 11, then 240 terminals in the vertical direction and 480 terminals in the horizontal direction are required. Furthermore, for example, ICs in which 120 elements are contained in one chip are used in both the vertical direction and the horizontal direction as the driving ICs that drive the respective pixels via these respective terminals. Specifically, driving in the vertical direction is performed using two ICs with 120 elements, and driving in the horizontal direction is performed using four ICs with 120 elements.

Here, the vertical sides and horizontal sides of the display part with a diagonal size of 4 inches are 60 mm × 80 mm. If the pitch of the terminals disposed on the peripheral edge portions of the liquid crystal panel 11 is less than 200 μm, a high degree of connection

technology is required, so that connection becomes difficult. Accordingly, the terminal pitch is set at 333 μm by dividing the direction of the horizontal sides into upper and lower sides, and installing two ICs on each of these sides. Furthermore, in the vertical direction, the terminal pitch is 250 μm even on a single side, so that two ICs are installed on a single side alone.

Both of such vertical direction ICs 12Y and horizontal direction ICs 12X are respectively mounted on and electrically connected to a plurality of corresponding tape carriers 13Y and 13X. In this connection, following the positional alignment of the terminals of the ICs 12X and 12Y on which gold (Au) bumps are formed and the terminals of the tape carriers 13X and 13Y constituting a polyimide film base in which copper (Cu) leads are plated with tin (Sn), the terminals are joined by applying heat and pressure so that Au/Sn eutectic [crystallization] is caused to take place.

Next, the carrier tapes 13X and 13Y on which the ICs 12X and 12Y have been mounted as described above are connected to the terminals on the peripheral edge portions of the liquid crystal panel 11. This connection is accomplished using anisotropic conductive films. Specifically, the terminals of the liquid crystal panel 11 and the output terminals of the tape carriers 13X and 13Y are formed at the same pitch; then, after the positions of these terminals are aligned, anisotropic conductive films are interposed, and the terminals are connected by the application of heat and pressure.

16 indicates an outer frame body made of metal; for example, this outer frame body is formed by a metal plate consisting of thin stainless steel, etc., with a thickness of approximately 0.5 to 1.0 mm. This outer frame body 16 has a frame shape comprising a planar front surface part 16a that covers the front surface peripheral edge portions of the above-mentioned liquid crystal panel 11, and depth parts 16b which are bent at right angles (as shown in the figures) or even more acute angles in the direction of depth from the outer periphery of the above-mentioned front surface part 16a. Furthermore, oblique joining surfaces 16c which correspond to the respective oblique parts 11a of the above-mentioned liquid crystal panel 11 are formed on the four corner parts of the depth parts 16b, and fastening holes 17 are formed in these joining surfaces 16c. Moreover, circuit wiring 18 is integrally formed on the inside surfaces of the depth parts 16b. This circuit wiring 18 respectively connects the terminal groups of the above-mentioned driving ICs 12X and 12Y, and provides specified voltages or signals to the input terminals of the driving ICs 12X and 12Y.

19 indicates an inner frame body made of metal, which is disposed on the inside of the above-mentioned outer frame body 16. In this inner frame body 19, a flat surface part 19a which faces the front surface part 16a of the above-mentioned outer frame body 16, and joining parts

19b which face the joining surfaces 16c at the corner parts of the depth parts 16b of the above-mentioned outer frame body 16 from the outsides of the four corner parts of the above-mentioned flat surface part 19a, are formed by bending. Furthermore, fastening holes 20 are formed in these joining parts 19b.

After the above-mentioned respective tape carriers 13X and 13Y have thus been connected to the terminals of the liquid crystal panel 11, [the tape carriers] are bent in the direction of depth with respect to the connecting surfaces in the vicinity of the outsides of the connection parts.

In this state, the above-mentioned outer frame body 16 is caused to cover [the liquid crystal panel 11] from the side of the front surface of the liquid crystal panel 11, the connection parts of the terminals of the liquid crystal panel 11 and the tape carriers 13X and 13Y connected by the anisotropic conductive films are covered from the front surface side by the front surface part 16a, and these parts are pressed by interposing a cushioning material 21 such as rubber, thus providing protection so that the bonded portions are not stripped. Furthermore, the portions of the tape carriers 13X and 13Y that are bent in the direction of depth, and the ICs 12X and 12Y that are mounted on these portions of the tape carriers, are covered and protected from the outside by the depth parts 16b of the outer frame body 16.

Furthermore, the inner frame body 19 is disposed on the inside of the above-mentioned outer frame body 16, the peripheral edge parts of the liquid crystal panel 11 are covered from the back surface side by the flat surface part 19a of the inner frame body 19, and the connection parts of the liquid crystal panel 11 and tape carriers 13X and 13Y that are connected by the anisotropic conductive films are clamped from the inside and outside (with a cushioning material 22 such as rubber interposed) by the front surface part 16a of the outer frame body 16 and the flat surface part 19a of the inner frame body 19. Moreover, the joining surfaces 16c of the corner parts in the depth parts 16b of the outer frame body 16 and the joining parts 19b of the inner frame body 19 are fastened together by means of one-sided fastening rivets 25 via the fastening holes 17 and 20 with spacers 23 interposed between the two parts.

Furthermore, the input terminals of the tape carriers 13X and 13Y are connected by soldering to the terminals of the circuit wiring 18 that is integrally formed on the inside surfaces of the depth parts 16b of the above-mentioned outer frame body 16. Specifically, the terminals on the input sides of the above-mentioned ICs 12X and 12Y are connected to the circuit wiring 18 via the tape carriers 13X and 13Y.

As is shown in Figure 4 (A), the above-mentioned one-sided fastening rivets 25 [each] consist of a fastening body 26 and a mandrel 27. In the above-mentioned fastening body 26, a

flange part 26b is integrally formed on the outer circumferential portion of the outer end of a cylindrical part 26a that has a specified length. Furthermore, the mandrel 27 is formed as follows: specifically, a rod member 27a which protrudes for a considerable length to the outside is inserted into the above-mentioned cylindrical part 26a, a constricted part 27b is formed in this rod member 27a at a point near the inside end of the rod member 27a, and a pressing body 27c which is positioned inside the outer diameter of the above-mentioned cylindrical part 26a is attached to the inside end portion of the rod member 27a. Furthermore, the above-mentioned fastening body 26 is formed from a metal material that is softer than [the material of] the mandrel 27.

In a state in which the rivet 25 is passed through the spacer 23 from the fastening hole 17 in the joining surface 16c of the outer frame body 16 and inserted into the fastening hole 20 in the joining part 19b of the inner frame body 19, so that the flange part 26b of the fastening body 26 contacts the counter-boring surface 17a of the fastening hole 17 as shown in Figure 4 (B), a fastening tool 28 is mounted on the rod member 27a of the mandrel 27 that protrudes to the outside. Next, this fastening tool 28 is operated, and is pulled outward so that the rod member 27a of the mandrel 27 is pulled out to the outside in a state in which the fastening body 26 is held in a fixed position. As a result, since the fastening body 26 consists of a metal material that is softer than [the material of] the mandrel 27, the fastening body 26 is pressed by the pressing body 27c of the mandrel 27 so that the fastening body 26 undergoes plastic deformation, thus causing the formation of an expanded part 26d on the inside end portion of the cylindrical part 26a of the fastening body 26. The outer frame body 16 and inner frame body 19 are fastened together between the flange part 26b and expanded part 26d. Next, as a result of the rod member 27a being pulled even further, the rod member 27a is cut from the constricted part 27b, and the major portion of the rod member 27a is pulled out to the outside with the pressing body 27c left in place, thus resulting in the fastened state shown in Figure 4 (C). Furthermore, in Figure 4 (C), a rivet 25 of the type in which the pressing body 27c is left in place is used; however, it would also of course be possible to use a rivet 25 of the type in which such a pressing body 27c is not left in place (as is shown in Figure 4 (D)). Thus, by joining the depth parts 16b of the outer frame body 16 and the joining parts 19b of the inner frame body 19 using one-sided fastening rivets 25, it is possible to fasten [these parts together] by work that is performed from the outside of the outer frame body 16. Accordingly, in the manufacture of the liquid crystal display device, the working characteristics are good, the amount of effort required for the assembly work can be reduced, and the working time can be shortened.

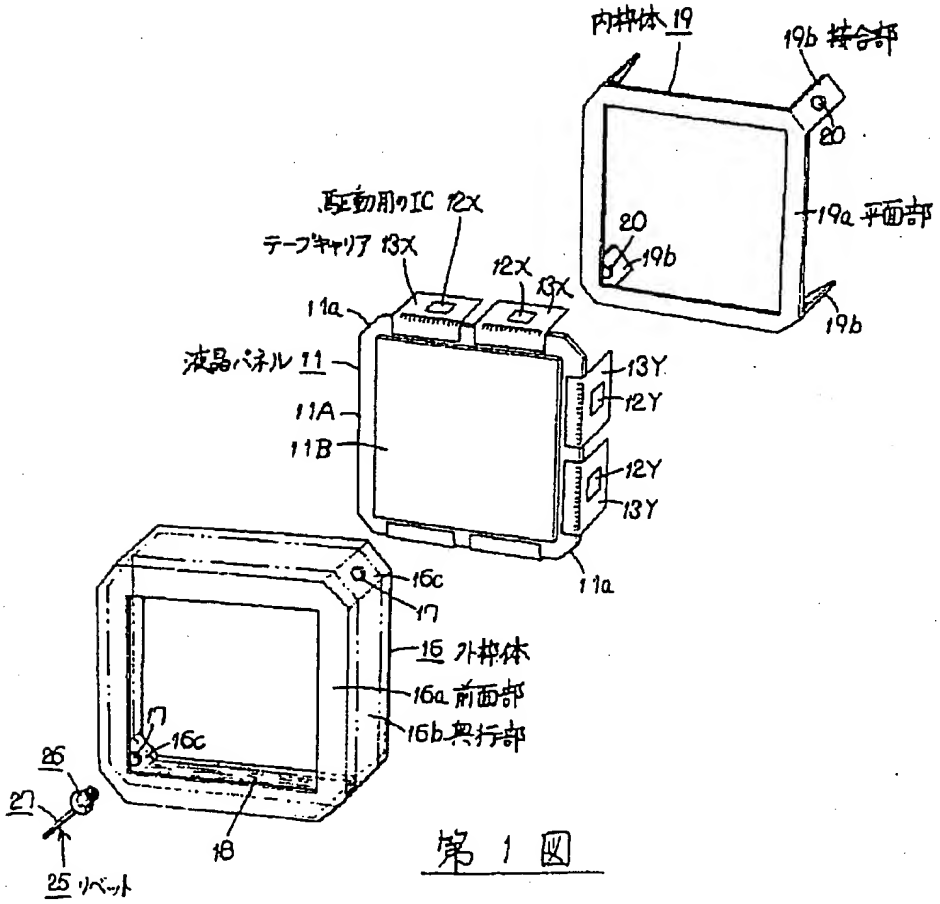
(Effect of the Device)

In the present device, since the depth parts of the outer frame body and the joining parts of the inner frame body are fastened together by using one-sided fastening rivets and mounting these rivets from the outside of the outer frame body, the working characteristics in the manufacture [of the liquid crystal display device] are good, the amount of effort required for the assembly work can be reduced, and the working time can be shortened. Accordingly, characteristics [suitable] for mass production are obtained, and the manufacturing cost can be reduced.

4. Brief Description of the Drawings

Figure 1 is an exploded perspective view which shows one embodiment of the liquid crystal display device of the present device. Figures 2 and 3 are partial sectional views respectively showing the assembled state of [the device shown in] Figure 1. Figures 4 (A), 4 (B), 4 (C) and 4 (D) are sectional views showing the conditions of mounting of the one-sided fastening rivet shown in Figure 1.

11... Liquid crystal panel; 12X, 12Y... Driving ICs; 13X, 13Y... Tape carriers; 16... Outer frame body; 16a... Front surface part; 16b... Depth parts; 19... Inner frame body; 19a... Flat surface part; 19b... Joining parts; 25... One-sided fastening rivet.



第 1 図

Figure 1

11:	Liquid crystal panel
12X:	Driving IC
13X:	Taper carrier
16:	Outer frame body
16a:	Front surface part
16b:	Depth part
19:	Inner frame body
19a:	Flat surface part
19b:	Joining part
25:	Rivet

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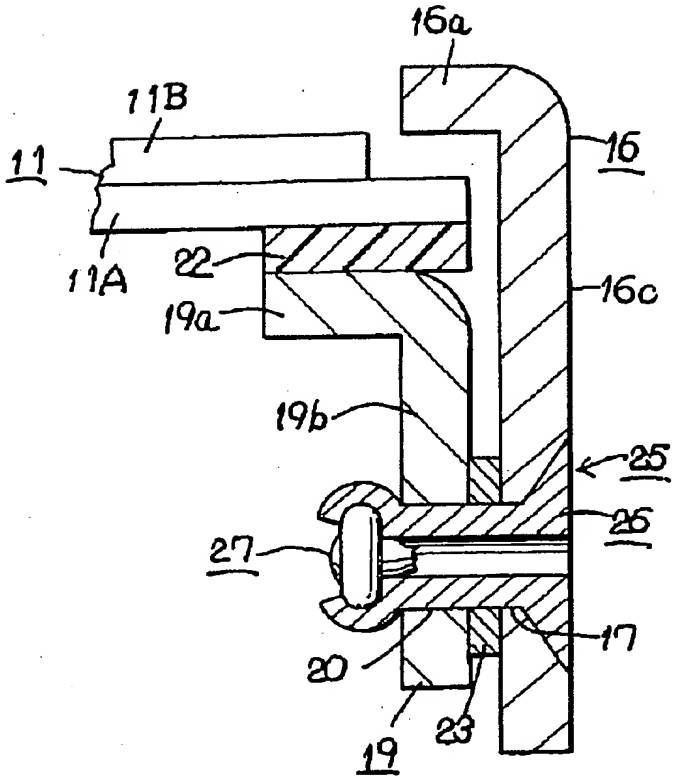
Agent: Noboru Karasawa, and three others [*seal*]



第２図

Figure 2

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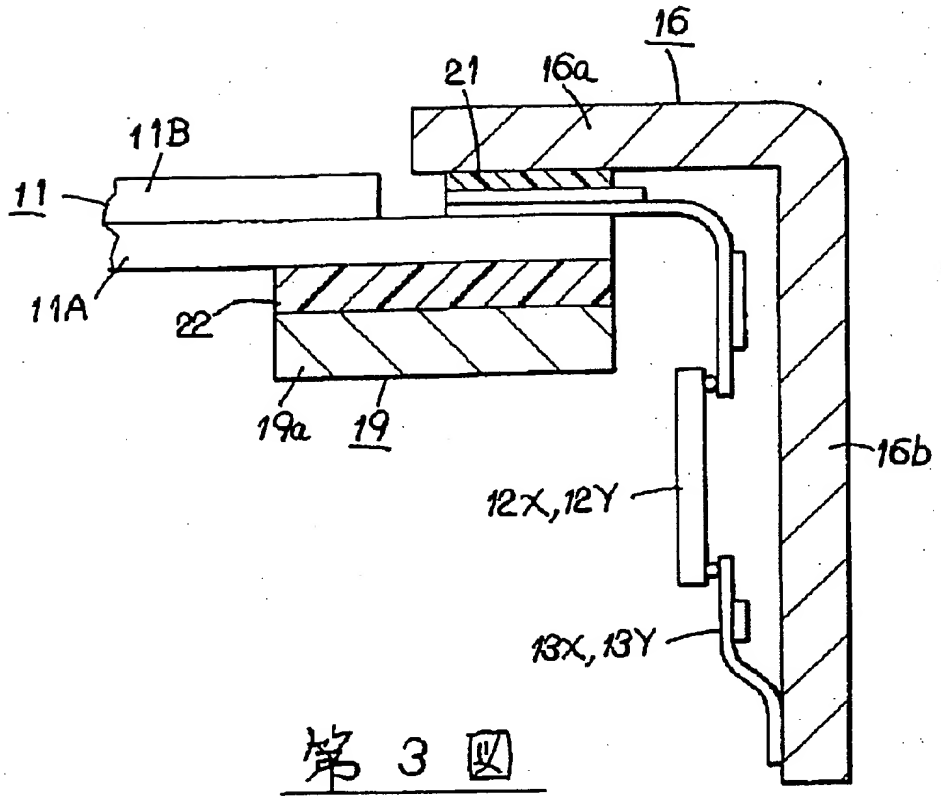

第 3 図

Figure 3

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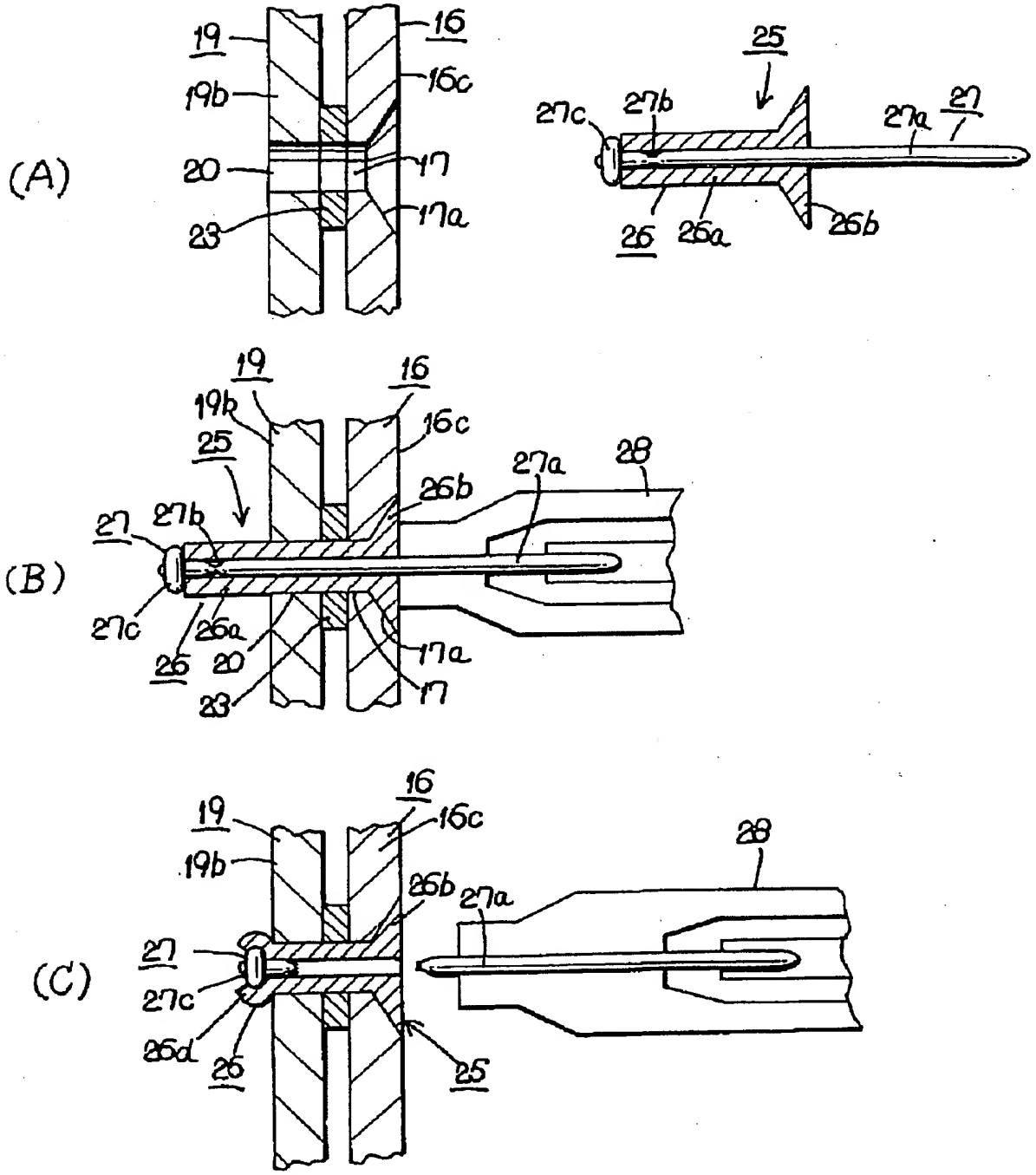

第 4 図

Figure 4

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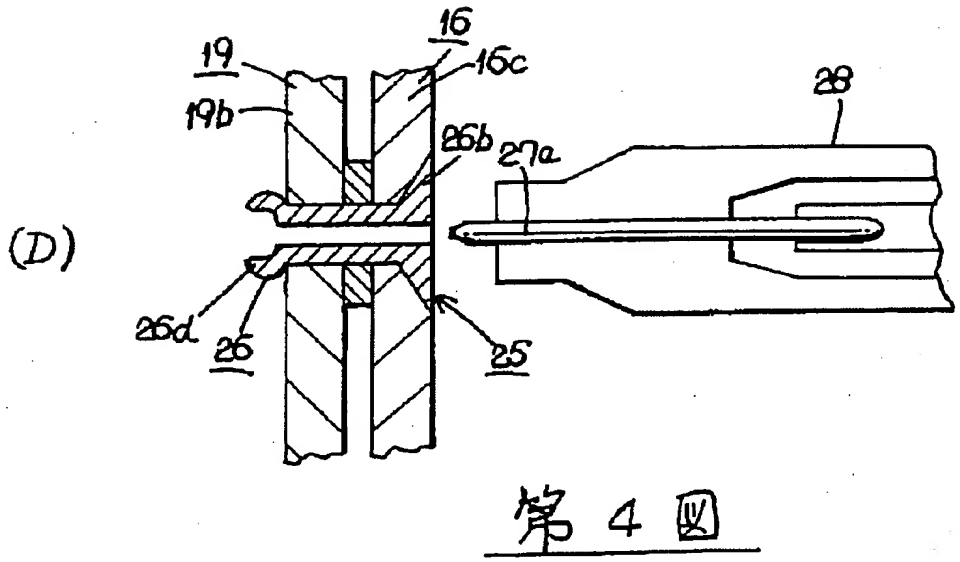

第 4 図

Figure 4

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